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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,272	05/01/2001	Hiroshi Nishibori	206405US2	3084

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EXAMINER
CRUZ, LOURDES C

ART UNIT	PAPER NUMBER
2827	

DATE MAILED: 10/21/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/845,272	NISHIBORI ET AL.	
	Examiner	Art Unit	
	Lourdes C. Cruz	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5,6 and 8-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,6 and 8-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3,5-6, and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Terasawa (US 5942797) in view of Braden et al. (US 5504372).

Terasawa discloses a power semiconductor device comprising:

- A ceramic substrate 21
- A power semiconductor element 1
- A circuit pattern 22 provided on an upper surface of the ceramic substrate on which the power semiconductor element 1 is held
- A lower pattern 23 provided entirely on a lower main surface of the ceramic substrate 21 opposite said upper main surface;
- A metal base plate 10 opposite said lower pattern; and
- A soldering layer (col. 5, lines 63+) between an entire surface of said lower pattern and said metal base plate for forming a bond therebetween

Terasawa, however, fails to specifically disclose the thickness of the ceramic substrate (Claim 1). See that Braden et al. teaches a ceramic substrate having a thickness of 1-3 mils in order to fascilitate the conduction of heat from the devices. It would have been obvious at the time the invention was made to combine the teachings of Braden et al. to those of Terasawa in order to obtain substrates that fascilitate heat conduction as disclosed by braden et al.

Terasawa also fails to disclose a metal base plate made of a Copper alloy and circuit patterns made of an aluminum alloy. However, see that Braden et al. teaches aluminum and copper alloys in the formation of metallic films. It would have been obvious to combine the teachings of Braden et al. to those of Terasawa at the time the invention was made since Copper alloys and Aluminum alloys are good heat conductors.

Also see that Terasawa teaches Cu as the metal base plate. It would have been obvious to one of ordinary skill in the art to use a copper alloy instead of copper in order to obtain a more durable metal plate.

Regarding the thickness of the circuit pattern, the soldering layer and the base plate such thicknesses do not cause any critical or unexpected results to the device's operation. Rather it is merely an obvious design choice determined by routine experimentation. In *Aller,* the court stated "Where the general conditions of a claim are

disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller,* 220 F.2d 454, 456 105 USPQ 233,235 (CCPA 1995). Therefore, it would have been obvious at the time the invention was made, to determine workable ranges of thickness of such layers for the teachings of Terasawa in view of Braden et al. in order to facilitate heat conduction from the semiconductor devices.

Additionally, see that while wire bumps are being claimed, such wire bumps are within a solder layer and are to be incorporated within it and flattened out. The prior art discussed above, Terasawa in view of Braden et al., teaches a flattened out sole solder layer. It would be obvious to one of skill in the art to form solder bumps within a solder layer since the outcome, a sole solder layer, wouldn't be affected.

Response to Arguments

Applicant's arguments filed 6-21-02 have been fully considered but they are not persuasive. Applicant argues:

- The Office Action improperly asserts that Braden teaches aluminum and copper alloys in the formation of metallic films
- Terasawa does not teach placing a soldering layer between an entire surface of a lower pattern and a metal base plate and that "there is no teaching here to use a sufficient amount of solder to form a solder layer"
- "...it cannot be said to be a teaching that an entire surface of this lower copper plate 23 is soldered to the metal base plate"

- Braden does not teach an aluminum alloy in the formation of films
- Components 12 and 14 of Braden are components of the case and in no way readable as any kind of metallic film
- Relying upon the Aller decision for the claimed range as being matter of routine experimentation is traversed by citing In re Antoine, more specifically by arguing that "the PTO must establish that the artisan would have known the particular parameter was a result -effective variable..."

The above argument are not persuasive because:

- Braden clearly teaches aluminum and copper alloys (col.6, lines 44+) as discussed in the Office Action above and they are uses in the formation of metallic films. The fact that the prior art does not specifically labels it a "layer" or "film" does not distinguish the present invention from that taught by the prior art since the prior art clearly shows that the claimed materials are known among semiconductor artisans. Moreover, labels, statements of intended use, or functional language such as we have here in "film" or "layer" does not structurally distinguish the claim over the prior art which shows a structure that may likewise be labeled, used or function as a "metallic film" or "layer" rather than a "base/cover components". See *In re Pearson* 181 USPQ 641, Ex parte Minks 169 USPQ 120, and *In re Swinwhart* 169 USPQ 226.

- While applicant argues that the prior art fails to teach "sufficient amount of solder" to form a solder layer, Applicant has failed to provide documentation showing that a layer of a material has to meet the limitations of "sufficient" stated by Applicant in order to be called or labeled as a layer, and/or a specific definition of "sufficient" that will leave out or disqualify the prior art's layer from meeting this limitation.
- Even if one or more solder joints that do not cover all the surface of the lower pattern were taught by the prior art, those joints would still anticipate the prior art since "an entire surface of said lower pattern" is considered broad structural language that could read on sections of the disclosed pattern.
- Although applicant argues that the PTO must establish that the artisan would have known the particular parameter was a "result-effective variable", applicant has obviated to address the examiner's statement of obviousness as to why one with ordinary skill in the art would experiment to determine workable ranges in thickness.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lourdes C. Cruz whose telephone number is 703-306-5691. The examiner can normally be reached on M-F 10:00- 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on 703-305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Lourdes C. Cruz
Examiner
Art Unit 2827

Lourdes Cruz
October 15, 2002

KAMAND CUNEO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800